

Continuous Infusion Drugs in ICU



by

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"أَسْتَجِيبُوا لِلرَّبِّكُمْ مِّن قَبْلِ أَن يَأْتِيَ يَوْمٌ لَا مَرَدَّ لَهُ مِنَ اللَّهِ
مَا لَكُمْ مِّن مَّلْجَأٍ يَوْمَئِذٍ وَمَا لَكُمْ مِّن نَّكَيرٍ"

الشورى ٤٧

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I- Vasopressors & Inotrops

1. Adrenaline

Concentration	1mg / 1ml
Dilution	Dextrose 5%
Precautions	<ul style="list-style-type: none">• Central line is required for administration• Stable for 24h• Sensitive to light and air; protection from light is recommended• Oxidation turns drug pink, then brown• Solutions should not be used if they are discolored or contain a precipitate• Inactivated in alkaline media, so don't mix with sodium bicarbonate
Dose	0.04–1 mcg/kg/min
Infusion rate	5amp X 50 ml ► 2 ml/h (0.05 mcg/kg/min)

2. Noradrenaline

Concentration	4 mg / 4ml (8 mg tartrate)
Dilution	Dextrose 5%
Precautions	<ul style="list-style-type: none">• Solution is stable for 24h• keep away from light ,don't use if brown coloration (oxidized)• Inactivated in alkaline media, so don't mix with sodium bicarbonate
Dose	0.2–1.3 mcg/kg/min
Infusion rate	2amp X 50 ml ► 10 ml/h (0.4 mcg/kg/min)

3. Dopamine

Concentration	200 mg /5ml
Dilution	Dextrose 5%
Precautions	<ul style="list-style-type: none">• Stable for 24h• keep away from light, don't use if brown coloration (oxidized)• Inactivated in alkaline media, so don't mix with sodium bicarbonate• High risk of precipitating arrhythmia• Renal dose is rarely used
Dose	Renal dose: 1-3mcg/kg/min Beta dose: 4- 10mcg/kg/min Alfa dose: > 10mcg/kg/min (max dose 20 mcg/kg/min)
Infusion rate	2amp X 50 ml ► 5 ml/h (10 mcg/kg/min)

4. Dobutamine

Concentration	250 mg / 5 ml
Dilution	Dextrose 5%
Precautions	<ul style="list-style-type: none">• Stable for 24h• keep away from light ,don't use if brown coloration (oxidized)• Inactivated in alkaline media, so don't mix with sodium bicarbonate
Dose	3-15mcg/kg/min (max dose 20 mcg/kg/min)
Infusion rate	2amp X 50 ml ► 2 ml/h (5 mcg/kg/min)

II- Vasodilators

1. Nitroglycerin

Concentration	50 mg/50ml
Dilution	Normal saline or dextrose 5% or thick
Precautions	<ul style="list-style-type: none">• Tolerance occur after 24h, to avoid this give interval free of drug at least 6h within 24h• Should not be used in patients who have taken a phosphodiesterase inhibitor within the past 24h because of the high risk of hypotension when these agents are combined
Dose	Venodilator (<50 mcg/min) Arteriodilator (>200 mcg/min) Mixed dose (50-200mcg/min)
Infusion rate	1 vial ► 0.6 ml/h (10 mcg/ min)

III- Antiarrhythmics

1. Amiodarone

Concentration	Amp 150 mg & tablet 200mg	
Dilution	Dextrose 5%	
Precautions	<ul style="list-style-type: none"> • High drug concentration > 3mg/ml associated with vein phlebitis • Stable for 24h 	
Dose & Infusion rate	<ul style="list-style-type: none"> • <i>AF (cardioversion)</i> Loading: ▪ 5–7 mg/kg IV over 30–60 min ▪ Then 1.2–1.8 g/day continuous IV Maintenance: 200–400 mg/day PO (100 mg/day for the elderly or low body mass) • <i>AF (rate control)</i> Loading: ▪ 300 mg over 1h ▪ Then 10-50mg/h over 24h Maintenance: 100-200mg/day • <i>Stable VT or SVT</i> ▪ First 24h: 1050 mg (7amp) according to following regimen <ol style="list-style-type: none"> a) First 10 min: 150 mg b) Next 6h: 1 mg/min c) Next 18h: 0.5 mg/min <ul style="list-style-type: none"> ▪ Maintenance: 400 mg/day 	<p>Loading: ▪ 3amp over 30-60min ▪ Then 10amp over 24h (5amp X 50ml ▶ 4.2ml/h then repeated once)</p> <p>Maintenance: 1-2 tab/day</p> <p>Loading: ▪ 2amp X 150 ml over 1h ▪ Then if dose 37.5mg/h ▶ 6amp 3amp X 50ml ▶ 4.1 ml/h repeated once</p> <p>Maintenance: 1/2 -1 tab/day</p> <p>a) 1amp X 100ml ▶ over 10 min b) 2.5amp X 50ml ▶ 8.3 ml/h c) 3.5 amp X 50ml ▶ 2.7 ml/h</p> <ul style="list-style-type: none"> ▪ 2 tablets/day

2. Lidocaine

Concentration	20 mg/ml. Vial 50ml /1000mg	
Dilution	Dextrose 5%	
Precautions	<ul style="list-style-type: none"> • Reduce bolus dose to half if LVEF < 40% • Reduce maintenance dose to half in patients with CHF, shock or hepatic • Infusion dose should be diluted, however IV bolus can be given thick • Too rapid infusion can cause seizures 	
Dose & Infusion rate	<ul style="list-style-type: none"> • <i>Stable VT (with a pulse)</i> <ul style="list-style-type: none"> ○ 1–1.5 mg/kg IVP (iv push) ○ Repeat 0.5–0.75 mg/kg every 3–5 min (max 3 mg/kg) ○ Maintenance 1–4 mg/min (14-57 mcg/kg/min) • <i>Pulseless VT/VF conversion</i> <ul style="list-style-type: none"> 1–1.5 mg/kg IVP over 3 min Repeat 0.5–0.75 mg/kg every 3–5 min (max 3 mg/kg) 	<p>3-5ml iv bolus Repeat 1.5-2.5 ml /3-5 min (max 11 ml) 1amp X 250 ml ► 15-60 ml/h</p> <p>3-5ml iv bolus Repeat 1.5-2.5 ml /3-5 min (max 11 ml)</p>

IV- Anticoagulants & Thrombolytics

1. Heparin

Concentration	5000 IU /amp	
Dilution	Normal saline	
Precautions	<ul style="list-style-type: none"> • Stable for 24h • Slight yellow coloration does not affect potency 	
Dose & Infusion rate	<p><i>ACS</i> 60 units/kg Then 15 unit/kg/h (max 1000 u/h)</p> <p><i>VTE</i> 80 units/kg Then 18 units/kg/h</p> <p><i>IV anticoagulation</i> 10,000 units Then 50-70 units/kg (5000-10,000 units) every 4-6h</p>	<p>1amp bolus 5amp X 50ml ► 2 ml/h</p> <p>1amp bolus then 5amp X 50ml ► 2.7 ml/h</p> <p>2amp bolus 1-2amp /4-6h</p>

2.Streptokinase

Concentration	1.5 million units	
Dilution	Normal saline or dextrose 5%	
Precautions	<ul style="list-style-type: none"> • Reconstituted solutions should be refrigerated and are stable for 24h • At room temperature used within 8h 	
Dose & Infusion rate	<p><i>STEMI</i> 1.5 million U over 1 h</p> <p><i>PE</i> 250,000 U over 30 min then 100,000 U/h for 24-72h</p>	<p>1.5 million U X 50ml ► over 1h</p> <p>1.5 million U X 50ml ► 8 ml over 30 min then 3.3 ml/h for 24-72h</p>

V- Bronchodilators

Aminophylline

Concentration	125 mg /5 ml
Dilution	Normal saline or dextrose 5%
Precautions	<ul style="list-style-type: none">• Stable for 24h• Adults 16-60 years max daily dose: aminophylline 1139 mg/day (equivalent to theophylline 900 mg/day)• Age > 60 years decrease dose to half• High risk of tachycardia and arrhythmia
Dose	Loading: 5.6 mg/kg over 30 min Then 0.6 mg /kg/h
Infusion rate	3amp X 250ml over 30 min Then 4amp X 50 ml ► 4 ml/h

VI- Diuretics

1. Furosemide

Concentration	40 mg /4 ml
Dilution	Normal saline
Precautions	Stable for 24h
Dose	Start with 80 mg Then 10 mg/h, increased to 40 mg/h according to disease
Infusion rate	5amp X 50ml ► start with 2.5ml/h

2. Torsemide

Concentration	10 mg /1 ml
Dilution	Normal saline
Precautions	Stable for 24h
Dose	Start with 20 mg Then 5-40 mg/h
Infusion rate	5amp X 50ml ► 5-40ml/h

VII- Proton pump inhibitors

Pantoprazole

Concentration	40 mg
Dilution	Normal saline
Precautions	Stable for 24h
Dose	Loading: 80 mg Maintenance: 8 mg/h
Infusion rate	2amp X 50ml ► 5ml/h

VIII- Sedation, Analgesia and Anti-epileptic

1. Midazolam

Concentration	5 mg /ml	
Dilution	Normal saline or dextrose 5%	
Precautions	<ul style="list-style-type: none"> • Stable for 24h • In status epilepticus withdraw gradually to prevent recurrence 	
Dose & Infusion rate	<p><i>Sedation</i> Loading: 0.5 to 4 mg repeat every 5-15 min until adequate sedation achieved Maintenance: 0.02-0.1 mg/kg/h</p> <p><i>Status epilepticus</i> Loading: 0.2 mg/kg Maintenance: 0.05-2 mg/kg/h</p>	<p>1amp X 10 ml ► 1-8 ml</p> <p>5amp X 50ml ► 3-14 ml /h</p> <p>3amp bolus over 5 min</p> <p>5amp X 50ml ► 7-280 ml/h</p>

2. Propofol

Concentration	200 mg/20ml	
Dilution	Usually used thick, if need dilution use dextrose 5%	
Precautions	<ul style="list-style-type: none"> • Avoid exposure to air • After transferred to a syringe or other container, use within 6h • Withdraw gradually to prevent recurrent status epilepticus • Using high doses > 5 mg/kg/h may precipitate "Propofol infusion syndrome" (heart failure, bradycardia, lactic acidosis, hyperlipidemia and rhabdomyolysis) 	
Dose & Infusion rate	<p><i>Sedation</i> Loading: 0.25-1 mg/kg Maintenance: 0.02-0.07 mg/kg/min</p> <p><i>Status epilepticus</i> Loading: 1-5 mg/kg Maintenance: 1-15 mg/kg/h</p>	<p>1amp thick ► 2-7ml</p> <p>2amp thick ► 8-30 ml/h</p> <p>1amp thick ► 7-35ml</p> <p>2amp thick ► 8-40 ml/h</p>

3. Fentanyl

Concentration	100 mcg /2ml
Dilution	Normal saline or dextrose 5%
Precautions	<ul style="list-style-type: none"> • Stable for 24h • May cause respiratory depression even if used in therapeutic dose
Dose	Shoots: 0.35 to 0.5 mcg/kg IV every 1/2-1h Continues infusion: 0.7 to 10 mcg/kg/h
Infusion rate	1amp X 10ml ► 3-4 ml over 2 min every 1/2-1h 5amp X 50ml ► 5-70ml/h

4. Morphine

Concentration	20 mg /2ml
Dilution	Normal saline or dextrose 5%
Precautions	Stable for 24h
Dose	Shoots: 0.01 to 0.15 mg/kg IV every 1-2h Continues infusion: 0.07 to 0.5 mg/kg/h
Infusion rate	1amp X 20ml ► 1-10ml every 1-2h over 5 min 5amp X 50ml ► 2.5-18ml/h

5. Phenytoin

Concentration	250 mg /5ml
Dilution	Normal saline
Precautions	<ul style="list-style-type: none"> • Stable for 4h only • Not refrigerate • Inject into a large peripheral or central vein • Flush line with saline before and after each IV dose to avoid local venous irritation caused by alkalinity of solution
Dose	loading : 15-18 mg/kg Then 5-8 mg /8h
Infusion rate	4 -5amp (22ml) X 100 ml over 30 min Then 2.5-3 ml X 7 ml /8h over 3 min.

IX- Neuromuscular blockers

Atracurium

Concentration	50 mg /5ml
Dilution	Dextrose 5%
Precautions	Stable for 24h
Dose	Bolus of 0.4 - 0.5 mg/kg, Followed by 0.2 – 1.2 mg/kg/h
Infusion rate	1amp X 10ml ► 5-7 ml Followed by 2amp X 50ml ► 7 – 42 ml/h